

Title: System and Method for Internet Broadcast Searching

Inventor: Mark E. Valenti

1 **Relationship to other Applications**

2 This application is a utility application which claims both the benefit and priority
3 of Serial No. 60/175,910 filed 01/13/00 entitled "Natural Language Broadcast Search
4 Paradigm."

5 **Field of the Invention**

6 This invention relates generally to searching on the World Wide Web. In this
7 usage the World Wide Web is meant to include all Internets and all Intranets, i.e. all
8 computer networks, interconnected or not. More particularly, the present invention
9 comprises a search paradigm implemented in hardware and software which distributes
10 the search for information on the world wide web to all website computers which then
11 search their own databases for elements of the requested search.

12 **Background of the Invention**

13 Internet searching is now the subject of much activity as well as research. Search
14 engines for both general and specific purposes abound. For example, search engines
15 from such websites as Yahoo.com, Excite.com, Lycos.com, Northernlight.com, all
16 attempt to build an index of the world wide web by accumulating website information in
17 a centralized database on a centralized computer system. Thus, any of these systems
18 involves literally indexing tens of millions of pages of information in order to allow a
19 search against that information be accomplished. Thus, when a user desires to find
20 specific information, the selected search engine must search its centralized index
21 database. Further, the centralized database must continue to update its database of web

1 pages or other computerized information in order to be current and accurate in the
2 searching that is performed. Obviously this inefficiency results in a difficult and
3 computationally expensive task.

4 Because of the structure of the centralized indexed database, search engines are
5 relatively static and do not receive instantaneous updates of information on individual
6 websites as those websites change. In addition, as new websites become active on the
7 Internet or as websites become inactive, search engines do not necessarily pick up this
8 fact leading to the reporting of results for websites that may no longer be present on the
9 web and missing the results from new websites.

10 Search engines also will never be able to contain all information from all
11 websites. This necessarily leads to searches which are not complete and result in missed
12 websites and information. Finally, certain search engines can be manipulated to deliver
13 preferred websites. Thus, an individual user searching the web may not receive the best
14 websites but will receive websites which the particular search engine prefers.

15 Enhancement of the web surfing process has been the subject of invention. For
16 example, Patent #5,761,663 to Lagarde et al was issued for a "Method for Distributed
17 Task Fulfillment of Web Browser requests." This invention causes requests from a
18 browser to be made to web servers on a network which receive and fulfill requests as an
19 agent of the browser client. Thus, either individuals searching by agents must take place
20 or, databases again exist which must be searched and which would potentially suffer from
21 the same problems as described above.

22 Patent #5,974,409 to Sanu et al was issued for a "System and Method for
23 Locating Information in an Online Network." This particular system operates as an

1 extension of a computer's operating system and not as a separate browser. Again,
2 multiple servers search different services in order to obtain information on what is stored
3 in the various services.

4 Patent #5,974,441 to Rogers et al was issued for a "WWW Client Server
5 Interactive System Method with Java." This patent makes requests to web servers on a
6 network which receive and fulfill requests as an agent of the browser client. It organizes
7 distributed sub agents in a series of servers which then conduct searching. Thus, a
8 distributed network of servers conduct additional searches returning the results to the
9 client.

10 Other systems such as Patent #6,055,526 to Ambroziak ("A Data Indexing
11 Technique"), Patent #5,995,959 to Friedman et al ("Method and System for Network
12 Information Access"), Patent #5,920,856 to Syeda-Mahmood ("System for Selecting
13 Multi-Media Databases Over Networks"), and Patent #4,914,571 to Baratz et al
14 ("Locating Resources in Computer Networks"), all rely upon obtaining information or
15 META-information about data that is stored in a network and searching that information.
16 All of these techniques also suffer from the issue of currency. That is, is all the
17 information that is being searched all of the information that is available to be searched?
18 In all cases the answer is no.

19 What would be truly useful is a system and method for searching the entire
20 content of the ever changing World Wide Web in its current state (i.e. the state at the
21 time and date of the searching) in the shortest time possible. Such a system would be
22 able to search not an index of pages, but the pages themselves returning results based
23 upon what actually exists and not based upon a summary of what actually exists.

1 **Summary of the Invention**

2 It is therefore an objective of the present invention to provide a more efficient
3 method of searching information on the World Wide Web.

4 It is yet another objective of the present invention to return results of a world wide
5 web search to a user which are current and not the result of stored information about the
6 information on the web.

7 It is yet another objective of the present invention to search for information on the
8 web that is accurate as of the moment of the search.

9 It is yet another objective of the present invention to conduct searching without
10 the need to update any centralized database of information.

11 It is a further objective of the present invention to conduct simultaneous searching
12 of all information from all websites on the World Wide Web.

13 It is yet another objective of the present invention to treat all search requests
14 equally, that is without regard to delivering preferred websites.

15 It is a further objective of the present invention to allow each search request to
16 instantaneously account for changes in information at each website.

17 It is a further objective of the present invention to allow searches to account for
18 the activation and deactivation of websites.

19 It is still another objective of the present invention to allow multiple
20 website computers to search information on their own websites. It is another objective of
21 the present invention to perform World Wide Web searches in the minimum theoretical
22 time possible.

23

1 It is still a further objective of the present invention to allow a search to generate
2 subsequent searches by website computers, each website computer being responsible for
3 the most current information on its own website.

4 These and other objectives of the present invention will become apparent from a
5 review of the specification that follows.

6 The present invention comprises an Internet Broadcast Search Paradigm (IBSP)
7 which causes a search for information on the world wide web to be distributed to all
8 website computers. The IBSP generally comprises three different embodiments: a direct
9 broadcast, a broadcast server, and a firewall server embodiment. However, other
10 combinations, as described later, are also possible.

11 The IBSP direct broadcast process involves a client (and user) computer, a
12 website computer, and an IBSP server computer. Obviously there are many client
13 computers which utilize the system. Each of these computers would be, for example and
14 without limitation, a PC owned by an individual. Each individual would conduct any
15 desired search. In addition, website computers are present and are those computers
16 which typically host and serve a website to the public. In general, there will be a single
17 IBSP server computer although this is not meant as a limitation. In order to speed up the
18 system and to accomplish load balancing, multiple IBSP server computers may be
19 present in the system, although they are not necessarily required.

20 Each of the three computer types contains a different IBSP computer program
21 which interacts with the other programs of the system. For example: website computers
22 contain an IBSP website computer program which permits multi level categorization of
23 the websites content by the web master. An example of such categorization is the

1 language used at the website, general website contents such as health, government,
2 entertainment, sports, etc. Other categorization of the website content can also be created
3 by the IBSP website computer program. Thus, for example, the category of "education"
4 may have multiple sublevels for elementary school, college, language, and other
5 categories.

6 The IBSP website computer program transmits the categorization information and
7 the website's internet address, i.e. its fully qualified domain name and/or its IP address
8 from the website to the IBSP server computer at the initialization of the website computer
9 and at various times thereafter. Further, the IBSP website computer program receives
10 and processes requests for information, such as search queries, from the client computers.
11 If the website has the requested information, it sends that information to the client
12 computer.

13 The IBSP server computer contains an IBSP server computer program which
14 receives and stores in a data file the IP address and the website categorization information
15 received from all of the website computers. In this usage, IP address, means either a
16 computer's IP address and/or its fully qualified domain name. Further, the IBSP server
17 computer program transmits the data file containing the IP address and the website
18 characterization of all website computers to client computers upon request.

19 Client computers contain an IBSP client computer program which acquires the
20 data file containing the IP address and website categorization information of all website
21 computers from the IBSP computer. This occurs upon installation, periodically
22 thereafter and when requested by the client.

1 The client computer accepts queries (search requests) from the user of the client
2 computer for distribution over the World Wide Web. The client computer software
3 permits users to categorize each query with the multi level website categorization
4 information. The query can then be transmitted by the client to all websites that have the
5 same multi level categorization as the query. Finally, the client IBSP software receives
6 and displays responses from websites that contain the requested information relating to
7 the query.

8 When the IBSP website computer program is installed on each website, all
9 websites will respond to search requests from the IBSP client software, thereby
10 conducting simultaneously searches on virtually every website computer on the World
11 Wide Web. Any such IBSP search examines the information on every website as it exists
12 at the moment of the search. Thus, all information is current. The system accounts for
13 not only the existing information on websites, but also accounts for the fact that certain
14 websites have become active or inactive. In the case of inactive websites , information is
15 not returned. Conversely, the IBSP search process can instantaneously account for the
16 activation of new websites because website information is transmitted to the IBSP server
17 computer at website startup and this information can be acquired by clients on demand.
18 Since each website performs a search of its own database in response to the client query,
19 information that is returned to a client is both current and complete.

20 It is important to note that the website query categorization actions are not
21 required in order to perform an IBSP search. Such categorization is used to minimize the
22 bandwidth required to perform a search in that categorization maximizes the search
23 efficiency. If website categorization is not utilized however, queries are transmitted to all

1 websites instead of to an appropriate subset of websites that are most likely to have the
2 desired information. As such, categorization reduces the query process and the burden on
3 all of the individual websites of the World Wide Web as well as the transmission burden
4 of sending the message to all websites simultaneously.

5 In the broadcast server embodiment of the present invention, the burden of the
6 client transmitting queries to many websites is removed by transferring that responsibility
7 to a broadcast server. In the IBSP broadcast server embodiment, four types of inter-
8 networked computers are present: a client or end user computer, web site computers, the
9 IBSP server computer, and broadcast server computers. Naturally there are many client,
10 website, and potentially numerous broadcast server computers. Only one IBSP server
11 computer is required again, although this is not meant as a limitation. Each of these
12 computer types requires a different IBSP computer program. All IBSP programs interact
13 with the other programs to achieve the desired search.

14 Website computers in the IBSP broadcast server process contain the same IBSP
15 website computer program noted above. Thus, the website can create its own
16 categorization, transmit its IP address and characterization to the IBSP server, receive and
17 process client queries, in this case, via the broadcast server computer, and send
18 information to the client computer.

19 The IBSP server computer contains the same IBSP server computer program first
20 noted above. Thus, the same program actions are conducted such as, receiving and
21 storing the IP address as well as the website categorization from all website computers,
22 transmitting the data file containing the IP address and website categorization, in this
23 case, to IBSP broadcast server computers upon request.

1 Client computers contain an IBSP client computer program which performs the
2 following functions: the program accepts queries from the user of the client computer for
3 searching on the World Wide Web, permits the user of the client computer to categorize
4 each query with multi level categorization of information from the various websites,
5 transmit the client IP address, the query, and the categorization information to a IBSP
6 broadcast server, and receive and display responses from websites that contain requested
7 information.

8 The IBSP broadcast server computer contains an IBSP broadcast server computer
9 program which performs the following functions: it acquires the data file containing the
10 IP address and website categorization information of all website computers by making
11 requests to the IBSP server computer upon software installation, periodically thereafter,
12 and on demand. In addition, the broadcast server receives queries, categorization
13 information, and the client's IP address from the clients , in order to execute the search
14 desired by the clients. Finally, the broadcast server transmits each query and the
15 requesting client's IP address to all websites that have the same multi level
16 characterization as the query, or in the alternative, simply broadcast the search to all
17 websites where categorization information is not available.

18 This broadcast server process embodiment of the present invention is more
19 efficient since the bandwidth required to transmit the data file containing the IP address
20 and the website categorization information of all website computers is reduced by simply
21 transmitting that information to fewer broadcast server computers. Thus, the need to
22 transmit such information to each potential client is eliminated. Further, the broadcast
23 server process transfers the burden of transmitting queries to many websites from the

1 client to the broadcast server. Thus, many clients are no longer broadcasting search
2 requests, but a smaller subset of broadcast server computers are performing this task.

3 In some instances, client computers will be connected to the World Wide Web via
4 a firewall computer. This is particularly the case in organizations where many computers
5 are present but only one access to the Internet is permitted. Thus individual client
6 computers may not have unique Internet IP addresses. In general, a unique IP address is
7 necessary in order to transmit responses from a website directly to a particular client.

8 However, in general, most individual clients within an organization have a unique
9 address, at least within the organization. Thus by placing the broadcast server program
10 on a firewall computer, thereby creating a firewall server and by directing website
11 responses to client queries first to the firewall server, the firewall server will then forward
12 any response to the correct client. In the IBSP firewall server process, four types of
13 Internet work computers are present: client or end user computers, website computers, the
14 IBSP server computer, and firewall server computers. Again, there are many client,
15 website, and firewall server computers but there need only be one IBSP server computer,
16 although this is not meant as a limitation.

17 Each computer type contains a different IBSP computer program and each
18 program interacts with the other programs as described below.

19 Website computers of the IBSP firewall server process contain the same IBSP
20 website computer program noted above. The functions of the website computer are again
21 to permit categorization of the websites content, to transmit the unique IP address of the
22 website and the categorization information to the IBSP server computer, receiving and
23 processing client requests for information which, in this case, are forwarded by firewall

1 computers and, if the requested information is present, sending that information back to
2 the firewall server computer for forwarding to the client.

3 The IBSP server computer in the firewall server process also contains the same
4 IBSP server computer program first noted above. The IBSP server computer in the
5 firewall server process receives and stores in a data file the IP address and the website
6 categorization from all website computers. Further, the IBSP server transmits the data
7 file containing the IP address and website categorization information of all website
8 computers to the firewall server computers upon request.

9 Client computers contain an IBSP client computer program similar to that
10 described above. The IBSP client computer program and the firewall server process
11 accepts queries from the user of the client computer, permits the user of the client
12 computer to categorize each query within a multi level categorization scheme, transmits
13 the client IP address, the query, and the categorization information, in this case, to a
14 firewall server, and receives and displays website responses transmitted from websites
15 and which are forwarded by the firewall server computer.

16 The firewall server computer contains an IBSP firewall server computer program
17 which performs the following functions: it acquires the data file that contains the IP
18 address and website categorization information of all website computers by requesting
19 such information from the IBSP server computer. This request occurs at software
20 installation and periodically thereafter. The firewall server computer also receives the
21 client's IP address, queries and categorization information from a client computer. The
22 firewall server computer also forwards each client query and client IP address to all
23 websites that have the same level categorization as noted by the client. In the event that

1 the client does not possess such categorization information, the firewall server computer
2 submits the query to all websites. The firewall server computer also receives responses
3 to a client query and the requesting client IP address from website computers and
4 forwards those website responses to the client within the organization.

5 Thus the firewall server process permits clients, who do not possess unique IP
6 address, to perform an IBSP Internet wide search.

7 In each of the alternative embodiments noted above, the same general function is
8 performed, that is a simultaneous search of all websites on the World Wide Web. The
9 system and method of the present invention will be more fully understood by a review of
10 the detailed description of the invention that follows.

11 **Brief Description of the Figures**

12 Figure 1 illustrates the architecture and communications flow of the IBSP direct
13 broadcast process.

14 Figure 2 illustrates the architecture and communications flow of the IBSP
15 broadcast server process.

16 Figure 3 illustrates the architecture and communications flow of the IBSP firewall
17 server process.

18 **Detailed Description of the Invention**

19 As noted above, the present invention is a system and method for searching
20 instantaneously for information on the World Wide Web. Using the architecture as noted
21 below, a client can simultaneously search every website on the World Wide Web, hereby
22 allowing for complete research to be accomplished. Referring to **Figure 1**, the
23 architecture and communications flow of the IBSP direct broadcast process is illustrated.

1 Websites **10, 12, 14, and 16** all comprise servers of the type known in the art for
2 managing websites. IBSP software on the websites categorize the information that is
3 stored on the website and transmits their individual IP addresses and categorization
4 information to the IBSP server **18**. This results in a data file **20** on the IBSP server **18**
5 which comprises the IP address and category information for the various websites **10, 12,**
6 **14, and 16**. It should be noted that, while four websites are shown, this is not meant as a
7 limitation. It is intended that eventually all websites will have the IBSP software
8 resonant on the website, therefore thousands of websites would be represented.
9 Similarly, the IBSP server **18** is a conventional type server using Windows NT[®] or the
10 like, and having storage for storage of the data file **20**. The IP addresses and category
11 information in the data file **20** are made available to clients **22, 24, 26, and 28** each of
12 which clients have IBSP client software on them. Queries are categorized by the client
13 and sent with the client IP address to websites with the same categorization as the query.
14 If the category information is not available, the query and client IP address are simply
15 broadcast to all the web servers **10, 12, 14, and 16**. When a web server receives such a
16 request, its searches itself and determines if any information responsive to the search
17 request is available. In this illustration, web server **10 and 12** have information that is
18 responsive to a search query posed by client **24**. In that instance, information is returned
19 to the client.

20 Referring to **Figure 2**, the IBSP broadcast server process architecture and
21 communications flow is illustrated. Again, servers **10, 12, 14, and 16** each contain IBSP
22 website software which categorizes the information on each website and transmits it
23 along with the individual website IP addresses to the IBSP server **18**. From this

1 information the IBSP server **18** creates a data file **20** which comprises the individual IP
2 addresses and categorization information for the websites **10, 12, 14** and **16**.

3 IP address and categorization information in data file **20** is transmitted in this case
4 to IBSP broadcast server **30** where that information is stored. Clients **22, 24, 26**, and **28**
5 can create queries to go over the World Wide Web. These queries are categorized and, in
6 this instance, proceed with the client IP address to the IBSP broadcast server **30**. IBSP
7 broadcast server **30** uses any query category information available to transmit the query
8 and Client IP address to websites with the same categorization or if no category
9 information is available transmits the request to all websites on the World Wide Web **10,**
10 **12, 14,** and **16**. In the event that any particular website has information responsive to the
11 query, such information is reported back to the client that has made the query. In this
12 illustration, website **10** and **12** each have information that is responsive to the query.
13 That information is returned to client **24**, which is the client that created the query first
14 sent to the IBSP broadcast server **30**.

15 Referring to **Figure 3**, the architecture and communications flow of the firewall
16 server process is illustrated. Once again, software that is resident on individual website
17 computers **10, 12, 14,** and **16** categorize the information in the website and transmit that
18 along with individual IP addresses to IBSP server **18**. IBSP server **18** creates the data file
19 **20** comprising the IP address and category information of the websites **10, 12, 14,** and **16**.
20 That IP address and category information is provided, in this case, to an IBSP firewall
21 server **32**. Firewall server **32** receives queries and client IP addresses from clients **22, 24,**
22 **26,** and **28** along with any category information. IBSP firewall server **32** then provides
23 that categorized query, the client IP address, the and firewall server IP address to

1 websites with the same categorization or if no category information is available transmits
2 the request to all websites on the World Wide Web 10, 12, 14, and 16.

3 Any websites that have information that is responsive to the queries provide that
4 information and the requesting client IP address back to the IBSP firewall server 32. In
5 this instance, web server 10, and 12 have information responsive to the query from the
6 client. The IBSP firewall server 32 then transmits that information to the appropriate
7 client 24 that posed the initial query.

8 Note that, during all Internet Protocol communication, the computer initiating a
9 transmission always transmits its own IP address, along with any other information, to
10 the computer receiving the transmission. Additionally note that computers with
11 information other than web sites can utilize and participate in the Internet Broadcast
12 Search Paradigm (IBSP). Any computer with any information available to other
13 computers can utilize the IBSP. These computers can reside either on an internal Intranet,
14 a private Internet, or the global Internet.

15 Using the system of the present invention, any IBSP broadcast search
16 instantaneously accounts for any changes in information at any website. Further, an
17 IBSP search instantaneously accounts for any activation or deactivation of websites on
18 the World Wide Web, returning information only from those web sites that are still
19 active. Using the system and method of the present invention, all websites are searched
20 simultaneously and, as the number of websites increase, the searching increases along
21 with the increase in the number of websites. Furthermore, the search occurs in the
22 minimum theoretical time.

1 Additional embodiments within the scope of the invention are also possible. Less
2 efficient hybrid processes exist that performs the same overall function as the Internet
3 Broadcast Search Paradigm (IBSP). A first hybrid process is a combination of the direct
4 broadcast process and the broadcast server process. This direct broadcast/broadcast server
5 hybrid process is the same as the broadcast server process except that the data file with IP
6 address and site category information is transmitted from the IBSP server to all the client
7 computers instead of to the IBSP broadcast server. The client then transmits the IP
8 addresses of sites that will be queried along with its own IP address and the query to the
9 IBSP broadcast server.

10 A second hybrid process is a combination of the direct broadcast process and the
11 firewall server process. This direct broadcast/firewall server hybrid process is the same as
12 the firewall server process except that the data file with IP address and site category
13 information is transmitted from the IBSP server through the firewall server to all the
14 client computers instead of only to the IBSP firewall server. The client then transmits the
15 IP addresses of sites that will be queried along with its own IP address and the query to
16 the IBSP firewall server.

17 A system and method for an Internet Broadcast Search Paradigm has now been
18 illustrated. It will be appreciated by those skilled in the art that other embodiments of the
19 present invention are possible without departing from the scope of the invention as
20 disclosed.

21